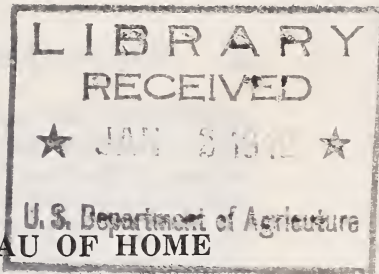


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REPORT OF THE CHIEF OF THE BUREAU OF HOME ECONOMICS, 1941

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF HOME ECONOMICS,
Washington, D. C., September 15, 1941.

HON. CLAUDE R. WICKARD,
Secretary of Agriculture.

DEAR MR. SECRETARY: I submit herewith the report of the Bureau of Home Economics for the fiscal year ended June 30, 1941.
LOUISE STANLEY, *Chief.*

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THE HOME—OUR FIRST LINE OF DEFENSE

The National Defense Program calls on the homes of the Nation to conserve strategic supplies, to adjust their purchases of goods and services to meet emergency demands, to build morale and physical fitness through diets planned by nutrition standards—in short, to make each home a conscious working unit in safeguarding our democracy.

Faced with the necessity of making such adjustments, homemakers are seeking more than ever the help of scientific facts. They know that the health and morale of the family are largely in their hands. They know that the men in factories and armed forces must have behind them the support of a family going along on reasonably even keel. They know that this pattern of sound civilian life is as necessary to maintaining our freedoms as guns and battleships. To make their contributions to defense through safeguarding the health and morale of their families and communities, the homemakers of this country are reaching out for every factual aid.

Agencies within and without the Government are also making every effort to plan defense production so as to safeguard living

standards. As a basis for such planning, they too seek accurate data on what goods and services American families are accustomed to use. They need more and more facts about the food, fiber, and all the other products consumed in the home, in terms of their real value to health and general well-being.

To meet these demands, the Bureau of Home Economics has put aside "research-as-usual." Instead, every project involving laboratory technician or economic analyst is geared to furnish facts essential to the national-defense effort. The following summaries give briefly some of the most important of the accomplishments of the past year.

FAMILY ECONOMICS

With the acceleration of the National Defense Program, Government agencies have become more and more concerned about preserving a balance between consumption and production, as defense has thrown unprecedented burdens upon national productive capacities. Information as to patterns of consumption—what families at different income levels buy and use—has become essential to plans for safeguarding national food supplies, for use of raw materials and factories for civilian needs, for programs of taxation and sale of defense bonds. Because of its studies of family consumption and its evaluation of the adequacy of levels of living, the Division of Family Economics has been able to provide the basic data of this sort needed by many agencies within and outside the Department.

Families, too, require help with their plans for use of income. Higher prices mean economies if the family income does not keep pace with the retail price level. Many household budgets will have to provide for items not heretofore included, such as tax payments and purchases of defense bonds. Meal plans and food budgets must be reviewed in the light of the new yardstick of nutrition. Farm plans for production for household use must be reappraised because of changed market situations for both buying and selling and because of our newer knowledge of nutrition. For help in meeting their problems of management of resources, families turn to this Division since its studies of family budgeting practices show various possible solutions of their difficulties.

CONSUMPTION PATTERNS OF FARM, VILLAGE, AND SMALL-CITY FAMILIES AT DIFFERENT INCOME LEVELS

An outstanding achievement for the year was the completing for publication of the remaining volumes of the series of 22 reports setting forth the results of the Nation-wide survey of consumer purchases. This study, undertaken in 1936 as a cooperative project with other Government agencies, provides information on the incomes and spending patterns of farm, village, and small-city families. These reports give the first comprehensive picture of the kind of living that families differing in size and income achieve in communities in various parts of the country. Seven of the volumes deal with income and family composition. Two—one for farm families and one for village and small-city families—deal with expenditures for and consumption of major items of goods and services in relation

to income. Twelve give details of the consumption of food, clothing, furnishings and equipment, housing and household operation, the automobile or other transportation, medical care, and other major budgetary items. One volume shows changes in the assets and liabilities of families during the course of a year.

With the Nation's present concern that agricultural and other production be planned so as to maximize the defense effort without unnecessarily lowering living levels, there is constant demand for the basic income and expenditure data resulting from this study and for the analysis of relationships between income, family size, and consumption. These figures are proving to be of great immediate value to many agencies in estimating the shifts in consumption of various goods and services with shifts in population distribution, income distribution, supplies of consumer goods, and taxation policies.

Families as well as nations are called on to adjust consumption to available supplies in a defense year. This is not a simple matter. While budgets as usual and buying as usual are out for the duration of the emergency, levels of living must not be sacrificed needlessly. Among families with rising incomes the adjustments to be made will, of course, be less burdensome than for those with fixed incomes. But to every family the scarcity of some goods, the higher prices of others, and the channeling of an increased proportion of family incomes into taxes and defense savings are serving to emphasize the need for planning purchases and home production so as to safeguard morale and living levels.

In making adjustments of plans for using incomes many families will give serious reconsideration to values in living and may shift somewhat the prominence given to various items in their budgets. For example, more money may go to food—not chiefly because of rising prices, but because food supplies are abundant and because through selecting nutritionally adequate diets they can take a forward step in helping to make America strong by making Americans stronger. More money may go for the care and repair of clothing and equipment; more will go into savings for post-defense spending.

In research on family budgets, ways of helping families adjust their financial plans under changed economic conditions are being emphasized. Special studies of budgeting practices are under way, and findings from this and other of the large-scale consumer purchases studies, especially those on food and clothing, are being rewritten for the layman to provide timely assistance to families, educators, and administrators. To families engaged in planning for the best use of their resources, these studies will indicate what practices other families in similar circumstances have followed in the past. For clothing, for example, they will show how many pairs of shoes, how many wool coats, how many work and dress garments and other items in the wardrobe are customarily used by members of families in various economic groups. Although reports of the expenditures of other families will serve to guide budgeting, they do not necessarily describe the most satisfactory or efficient way of spending. Each family will have to decide what adjustments it will make in its own situation. But by comparing their own spending plans with average figures, families can see wherein their problems are different from those of their neighbors and may be led to consider why such deviations may be necessary and wise.

The family budgets developed from data of the consumer purchases study were used in the determination, in cooperation with other agencies, of the relative cost of living in several rural nonfarm communities. The figures were requested by the War Department and other agencies in their planning for the decentralization of industry. These data on differences in the cost of living between one rural area and another and on changes in the cost of living within an area from one period to another are of fundamental importance in determining defense production policies.

IMPROVING FAMILY DIETS

The National Nutrition Conference for Defense, held in May 1941 in Washington, D. C., focused attention on the importance of continuous research on food-consumption and dietary levels. Nationwide studies of what farm, city, and village families are eating helped to lay the groundwork for our national drive toward better nutrition. The Bureau of Home Economics provided an answer to the question "Are we well fed?" by supplying data which show that an appalling number of families in the United States have been living on diets below the safety line in the recent past.

Diet improvement among low-income groups calls for increases in the consumption of dairy products, green and leafy vegetables, and of vitamin C-rich fruits and vegetables, increases in the proportion of grain products consumed in "enriched" or less highly refined forms, and in some sections of the country the use of more meat, fish, poultry, and eggs.

To accomplish such improvement three things are necessary: 1. Families must know how to select foods to promote good health. Within their economic resources they must choose the kinds and the proportions of products that will satisfy their nutritional needs as well as their taste. 2. Farmers must produce increased quantities of many foods if there is to be a supply large enough to provide an adequate diet to every citizen. 3. Families must have resources to produce or purchase the foods they need.

The researches of the last year have provided basic data on some one or more aspects of all three problems. To help families the country over to know what types of food are needed to insure adequate nutrition and how they may make better use of the Nation's food supply, the Bureau's well-known food budgets have been revised to bring them in line with the newer knowledge of nutrition. Dietary allowances recommended by the National Research Council's Food and Nutrition Committee in terms of calories, protein, minerals, and vitamins have been translated into the quarts of milk, loaves of bread, and pounds of vegetables, fruits, and meats that farmers and homemakers alike must consider.

Armed with the new diet plans, city and village families with high, moderate, or low incomes can plan market lists that may be made up into nutritious and appetizing meals. Farm families in the South or in the North or West can figure out what food they need for the year ahead—what they must buy; what they can produce at home.

These diet plans also are basic to planning agricultural production for defense. In response to requests from Government agencies the

Bureau is compiling the quantities of various foods needed for health (1) when provided in the most economical combinations consistent with American food habits and (2) when provided with expenditures no greater than the usual outlays for food. By comparing these with the quantities customarily consumed by different economic groups, one can see the adjustments needed if agricultural production is to be truly geared to domestic needs.

Neither the knowledge of what to eat nor the production of vast stocks of food will improve the nutrition of families until science and supply meet in the market baskets and on the tables of families. Continuing its studies of the significance to consumers of Department programs to bridge the gap between farm surpluses and underfed families, the Bureau undertook 2 investigations in 1940 in cooperation with the Bureau of Agricultural Economics. One was a study, in 11 communities, of the nutritive value of free school lunches incorporating surplus foods, and the importance of these lunches to the children's diets; the other was a study of the effect of low-priced milk on the consumption of dairy products among families on relief in Washington, D. C.

NUTRITIVE VALUE OF FREE SCHOOL LUNCHES

For 11 communities the nutritive value of the free hot noon lunches served in 1939-40 was determined. These lunch projects were sponsored by local agencies and the Work Projects Administration and used, in part, surplus food supplied by the Surplus Marketing Administration. The projects were located in Washington, D. C.; Menard, Saline, and Williamson Counties, Ill.; Atchison, Ford, and Neosho Counties, Kans.; Holyoke, Mass.; Altoona, Pa.; and Portage and Iron Counties, Wis.

In at least 6 of the 11 communities the lunches served provided between 530 and 700 calories per child per day. The range in average energy value of lunches was from 310 calories per child in Iron County, Wis., to 1,180 calories in Neosho County, Kans. Half or more of the calories were supplied by the food donated by the sponsor in 6 communities and by the food donated by the Surplus Marketing Administration in the other 5. Grain products usually were the chief calorie bearers; this food group provided an average of one-fourth or more of the calories for each lunch unit.

In general, the analysis indicated, the free school lunches might well have been more ample in some nutrients. In 5 projects, foods donated by the Surplus Marketing Administration provided about half or more of the energy value of the noon meals; in 7, about half or more of the iron; in 6 projects, about half or more of the vitamin A; in 5, about half or more of the vitamin B₁; and in 10, half or more of the ascorbic acid. The most important source of ascorbic acid was oranges, large quantities of which were distributed to school lunches in 1939-40.

Many free school lunches were in need of further improvement with respect to the calcium, vitamin A value, and riboflavin content of the meals. The calcium content of the lunches depends chiefly, but not entirely, on the quantities of milk and milk products used. In the Washington, D. C., schools the lunch provided more milk for

each child in a day than the Williamson County schools provided in a month. In Washington, where the lunches included 5.3 quarts per month of fluid milk or its equivalent in other form, they provided an average of 0.41 gram of calcium per child per lunch. At the other extreme, the lunch served in Williamson County included only 0.2 quart of milk per child per month, but it furnished 0.11 gram of calcium per child per lunch because other calcium-rich foods were included.

There was wide variation among the projects in average values for vitamin A per noon meal. The food served in six communities furnished between 1,000 and 1,600 International Units of vitamin A value per child per lunch, while in five localities the noon meals furnished between 2,500 and 4,600. The vitamin A value was furnished chiefly by vegetables and fruit, although butter, which was on the surplus list during the entire period covered, also contributed considerable amounts.

Surplus foods added relatively less of riboflavin to the free school lunches than of other nutrients, except calcium. Like calcium, the riboflavin value of the lunches was closely related to the quantity of milk served. The sponsors of each school-lunch project contributed practically all the milk used in lunch preparation.

The full report of the analysis of the nutritive value of free school lunches described here briefly will appear in a special report, *The School Lunch Program and Agricultural Surplus Disposal*.

5-CENT MILK IN THE DIETS OF FAMILIES ON RELIEF

In the District of Columbia, as in several other places throughout the country, marketing experiments are under way to increase the consumption of fluid milk by lowering the price to certain low-income groups. Milk at 5 cents a quart became available in Washington, D. C., to families on relief and those awaiting WPA assignment in August 1940.

To determine the effects of this program on the consumption of dairy products, trained field agents of the Bureau interviewed a random sample of 624 eligible low-income families—one-third were white and two-thirds Negro—before and after the inauguration of the program. Before the program went into effect the white families interviewed were buying an average of 1.1 quarts of fluid milk per person per week at a price of 11 cents or more per quart. Negro families were buying about half this quantity, 0.6 quart, at the same average price.

At the time of the second interview, i. e., after 5-cent milk had become available, a few more than half of the families—321 out of 624—were participating in the low-priced milk program. Among the 102 participating white families, the aggregate consumption of fluid milk (purchased and free) was more than twice as great at the time of the second survey as at the first, while the quantities of fluid milk purchased were nearly three times greater. Aggregate money expenditures for fluid milk went up 24 percent. Of the purchased milk about 80 percent was bought at 5 cents a quart.

Among the 219 participating Negro families, the aggregate consumption of fluid milk (purchased and free) increased threefold between the first and second surveys. The quantities purchased

almost quadrupled. Aggregate expenditures for fluid milk increased more than 50 percent. Of the fluid milk bought, over 90 percent was purchased at 5 cents a quart.

The aggregate consumption of milk in all forms—fluid, evaporated, dried, or as cheese, whether free or purchased—increased 59 percent among white families participating in the program and 85 percent among the Negro, although no more money was spent for dairy products after the program went into effect than before. The increased money expenditures for fluid milk came through a shift from other dairy products to fluid milk, rather than by allocating to dairy products a larger share of the money for food or money for living. At the low economic level represented by families on relief the competition between food and other items in the family budget is very keen.

The complete report of this study of the effect of a low-priced milk program on the consumption of dairy products among certain groups of low-income families eligible for participation in the 5-cent milk program is now in manuscript.

FOODS AND NUTRITION

Adequate national defense calls for a well-fed Nation. A knowledge of the food needs of the individual and of the nutritive values of different foods is the foundation upon which any nutrition program is built. Of equal importance are the production of foods of good quality and the development of methods of processing and preparation designed to retain maximum nutritive value without sacrifice of taste and appearance. The research program in foods and nutrition has been directed toward supplying information needed by those responsible for planning better nutrition on a national scale, by others who must feed our armed forces and civilian defense workers, and by the American Red Cross in its work of selecting the most suitable types of food to send abroad.

NUTRITIONAL PHYSIOLOGY

An adequate supply of vitamin A has long been recognized as essential for sustaining maximum vision in dim light. Under modern conditions, many military and defense activities must be carried on after daylight hours, and the ability to see as effectively as possible takes on added importance.

Vitamin A is one of the few vitamins that the body can store for later use. Research conducted in our laboratories shows that adults vary considerably in their ability to store vitamin A for future use. It was also found that, in general, large daily excesses of vitamin A are not as efficiently stored as smaller excesses. The most effective and economical means of building up a vitamin A reserve is to provide moderate dietary excesses of vitamin A regularly rather than to provide large excesses periodically or for short periods of time. When 50 to 100 percent more than the minimum daily requirement for vitamin A was provided in the diet, most of the adults tested were able to store about half of the excess as a bodily reserve, while with a 200-percent excess they appeared to store only about one-fifth.

In all cases when the vitamin A requirements for growth were satisfied, young animals restricted to comparatively low levels of vitamin A were found to possess normal adaptation to dim light. With increasing amounts of vitamin A or vitamin A-active carotene in the diet, only negligible amounts of vitamin A were stored in their livers until the dietary supply of vitamin A was increased to about four times the minimum amount that would promote normal growth. Apparently, significant amounts of vitamin A were taken up by other tissues of vitamin A-deficient animals before large reserves of this vitamin accumulated in the livers.

For some reason not well understood at present, human adults appear to use vitamin A-active carotene less effectively than vitamin A itself for the prevention or cure of night blindness. On an average, 1,000 International Units of vitamin A-active carotene appeared to have about the same effectiveness in this respect as 600 units of vitamin A. It has been generally supposed that fats or certain constituents commonly found in edible fats had some favorable effect upon the utilization of carotene. This situation is of real significance because 60 to 100 percent of the vitamin A value in American diets is derived from the vitamin A-active carotene in foods.

Young animals deprived of vitamin A until their bodily reserves of this vitamin were exhausted were found to utilize carotene very poorly when fats and materials commonly carried by fats were excluded from their diets. The utilization of carotene by young animals was judged according to their rates of growth and their general physical condition. When linoleic acid—the fatty acid essential to nutrition—and the vitamin K-active compound, 2-methyl-1, 4-naphthoquinone, were fed in addition to the carotene, the growth and physical condition of the animals was as good as when common edible fats, such as cottonseed oil, were fed with the carotene.

VITAMIN CONTENT OF FOODS

Measurements of the vitamin A values for 128 food items commonly used in American dietaries were completed this year and the results prepared for publication. The values in each case were determined directly in terms of International Units. For those foods widely consumed in cooked form measurements of vitamin A value were made both before and after cooking.

A compilation of the vitamin A, thiamin, ascorbic acid, vitamin D, and riboflavin content of foods in relation to processing and other variants was completed and prepared for publication. The vitamin values, obtained from a comprehensive survey of the scientific literature, include practically all the available data reported in terms of International Unit values or in terms of absolute weights of the vitamins through December 1940. Specific references were cited for all data included in the compilation.

An extensive investigation of the changes in vitamin values of foods resulting from ordinary cooking or processing was made as a means of evaluating nutritive values of cooked or otherwise processed foods. Dehydrated and other forms of concentrated food were analyzed to provide needed information on food selected for shipment abroad.

Peanuts, which have highly concentrated nutritive value—including fat, protein of excellent biological value, and B-vitamins—were found to lose from 75 to 80 percent of their thiamin (vitamin B₁) value when processed in hot oil or roasted for use as salted nuts or in peanut butter.

Commercial or household methods of canning lean pork resulted in products containing about 350 to 400 micrograms of thiamin in 100 grams, representing a loss of about 80 percent of the thiamin carried by the raw pork. Frying slices of lean ham brought about less than a 10-percent loss in thiamin value.

Dried beans lost practically no thiamin when cooked in boiling water, but they lost about 30 percent of their thiamin value when baked. Commercially canned baked beans were about three-fourths as rich in thiamin value as home-baked beans.

Samples of blackstrap molasses from Cuba, Puerto Rico, and San Domingo carried about 90 to 120 micrograms of thiamin per 100 grams of molasses. Highly refined molasses carried only negligible amounts of this vitamin.

Potatoes lost about 50 percent of their ascorbic acid (vitamin C) value when made into potato chips. When stored at room temperature, potato chips continued to lose ascorbic acid slowly.

Spinach, a food rich in vitamin A value, was found to carry only half as much vitamin A value when dried without preliminary cooking as when dried after being cooked. In contrast to such foods as carrots and sweetpotatoes, almost all green leafy vegetables lose vitamin A fairly rapidly when stored; they lose it especially fast if they are allowed to stand after being chopped. Preliminary investigations point to the fact that green leafy foods contain an enzyme which accelerates the destruction of the vitamin A-active carotene in green leaves.

FOOD-COMPOSITION STUDIES

The usual need for material on the composition of foods has been heightened by the national emergency. Accordingly, the regular work on the chemical composition of foods has been accelerated and adapted to the defense program. The results of numerous studies on the minerals important to nutrition and on the proximate constituents in foods are being assembled, evaluated, and summarized. Natural variation and differences in production, processing, and preparation received special consideration. Many original publications and a large amount of hitherto unpublished data, acquired through the collaboration of workers in other laboratories, are the source for this material. The compilation of figures on the calcium, phosphorus, and iron in 50 foods is nearing completion.

Information concerning the nutritive value of many different foods has been furnished defense agencies and others. Such figures have been used in determining the merits of particular foods considered for purchase by the Surplus Marketing Administration and by the Red Cross, for shipment to foreign countries, and in planning under the national nutrition program. Results are also used as a basis for evaluating the nutritive value of a few special rations under investigation by the Army and the Navy.

A laboratory has been installed to supply much-needed information on the mineral composition of foods of known cultural history and known treatment. This laboratory will be particularly suitable for investigating such inorganic elements as iron and other trace elements, as well as calcium and phosphorus.

FOOD-SELECTION AND FOOD-PREPARATION STUDIES

Armed with the new yardstick for good nutrition, the homemaker still needs supplementary information on food selection and preparation. All the accumulated scientific dietary knowledge is useless unless it forms the basis for appetizing, nourishing meals. To help the Nation's cooks with their problems of buying and preparing food so that they get the most real value for their money is an important aspect of the Bureau's work in foods and nutrition.

The nutrition program is emphasizing and encouraging the use of food products that are rich sources of protein, vitamins, and minerals. Soybean, peanut, and rice-polish flours are being studied in this connection. Soybean flour has been used successfully in a 25-percent substitution for white flour; in some products, such as baking-powder biscuits, as much as 50-percent substitution by weight can be used. Peanut flour can be substituted up to 70 percent in certain products, but 40 percent by weight is preferred. In testing products made with rice polish it was found that 25- to 33 $\frac{1}{3}$ -percent substitution by volume for white flour gave a good product. When 50 percent was used, the flavor was bitter unless masked by an added flavor such as chocolate or spice.

Enriched flours from a number of different flour mills have been tested to determine whether their use calls for any adjustments in recipes. No adjustments have been found necessary. These flours have also been tested to determine whether aging affects the flavor of those that have been enriched by the addition of synthetics. No unpleasant flavors have been detected.

Cooperating with the Surplus Marketing Administration in connection with the purchase of food for school-lunch programs, for the Red Cross, and for shipment abroad, the Bureau has tested over 300 dehydrated food products. Dehydrated soups, potato flakes, eggs, vegetables, and fruits have been included in these tests. Other food concentrates (citrus fruits) and prepared powders have been tested for palatability, and their ascorbic acid content has been determined.

Several brands of dried whole egg, egg yolk, and egg white were substituted successfully for fresh egg in various recipes. Dried eggs stored at 40° F. were found to keep much better than those stored at room temperature. Studies are being continued to determine methods of dehydration and storage conditions to maintain the quality of the product.

The studies of meat and poultry quality have been continued in cooperation with two other Bureaus in the Department and a number of State agricultural experiment stations. These investigations are carried on to determine the influence of production factors, such as breed or strain, sex, age, ration, curing method, and storage conditions on the edible quality of meat and poultry.

Other projects are under way to determine whether the source of heat and the method by which it is transferred affect the edible

quality of the cooked meat. One of these projects entails a comparison of paired cuts of meat cooked in electric- and gas-fired ovens. Preliminary tests, in which beef, lamb, and pork were roasted by the same method in the two types of ovens, showed no important differences in the cooked meat.

In working toward closer estimates of the nutritive value of cooked meat and the number of servings available per pound of meat purchased, cooking losses must be accurately known. Preliminary studies of the distribution of these losses between the flesh and bone portions of roasts have consisted of determining the moisture and fat content of each portion of raw and cooked cuts. Paired rib roasts of beef were used; one of each pair was analyzed raw and the other after cooking. The data available at present indicate that the flesh portion contributes the greater part of the moisture loss during roasting.

Turkeys of different weights were tested to determine the relationship between this factor, the method of cooking used, and the yield of cooked meat. Some birds were cooked in water or steam, and some in ovens in open pans or under cover; the oven temperatures also were varied. The yield of meat after cooking (white and dark combined) appeared to be less definitely related to the cooking methods used than to the original weight of the bird. For 13-pound turkeys (dressed weight) the cooked meat averaged 28 percent, and for 25- to 30-pound turkeys (dressed weight) the cooked meat averaged 34 percent. The bones of cooked turkeys weighed, on an average, 9 percent of the dressed weight. In a similar study of fowls, or stewing chickens, the cooked meat averaged 26 percent and the bones 9 percent of the dressed weight.

The results of a cooperative study of the effect of storage conditions on the quality of frozen cockerels were published during the year. As shown by external appearance, chemical determinations, and bacterial counts of uncooked chickens and by the palatability of roasted chickens after 1, 2, and 3 years in storage, -20° F. produces better results than does 0° . Drawing the birds before freezing them apparently has little effect, either favorable or unfavorable, during customary periods of storage, but during more prolonged periods the thigh meat of poultry is more palatable if the birds are drawn.

At the request of the Bureau of Animal Industry, frozen turkeys were cooked to determine whether the preservation methods used produced satisfactory results. Similarly, smoked turkeys also were cooked.

The leaflet of poultry recipes published at the time of the last meeting of the World's Poultry Congress was enlarged and illustrated to give comprehensive directions for cooking chicken, turkey, duck, goose, guinea, and squab.

In cooperation with the Corn Industries Research Foundation, the study in which corn sirup and dextrose are used in food products is being continued. In this study, emphasis is placed on their use in the preparation of frozen desserts and in the preparation of fruits to be preserved by freezing.

From the past year's experimental work it can be said in general that in the products tested, sugar may be replaced with a 25-percent substitution, by either weight or measure, of corn sirup or dextrose.

From the results of organoleptic tests, it appears that corn sirup is one-half as sweet by measure as sucrose and one-third as sweet by weight, whereas dextrose is one-half as sweet by measure as sucrose and two-thirds as sweet by weight.

Corn sirup and dextrose may be used as the only sweetening in beverages, puddings, custards, and sauces. For sweetening equal to that of sugar, twice as much corn sirup or dextrose is required. If corn sirup is used, the other liquids must be reduced by one-fourth. In baked products—such as muffins, plain cake, and drop cookies—corn sirup may be substituted, measure for measure, for sugar with a reduction of one-third the liquid. Also, up to one-third the measure of sugar may be replaced by dextrose in these products, although a less sweet product will result. Various proportions of corn sirup and dextrose may be used in candies, icings, and mousses, depending on the consistency desired. Half the measure of sugar in stewed fruits may be replaced by dextrose or corn sirup. Fresh fruit may be sweetened with dextrose if desired.

In studying corn sirup and corn sugar in the preservation of fruits, it was found that 30 percent by weight of the sugar required to can peaches and pears could be replaced by either of these products. In cherry and strawberry preserves, a 50-percent substitution by weight of corn sirup or 25 percent of corn sugar were satisfactory. Up to 30 percent of the sugar used in currant, loganberry, Concord grape, blackberry, and cranberry jellies could be replaced with either corn sirup or corn sugar, although 25 percent was preferable. Quick sweet pickles were found acceptable with a 30-percent substitution by measure of corn sirup or corn sugar.

Studies of seasonal quality of old and new varieties of potatoes were continued in cooperation with the Bureau of Plant Industry. Twenty-five varieties of potatoes grown at Presque Isle, Maine, as well as three varieties grown at Greeley, Colo., were cooked and judged for quality. Of the Maine varieties studied only one, Irish Cobbler, was called excellent; six were called good—Nittany Cobbler, Mesaba, Red Warba, Warba, Green Mountain, and Houma; six were called average—Earlaine, Triumph, S. 46952, Chippewa No. 1, Katahdin, and Rural New York; six were called fair—Earlaine No. 2, Chippewa No. 2, Sebago, Sequoia, Pontiac, and Pennigan; and none was called poor. Of the Colorado varieties, Katahdin was called good and C. S. 1009 and C. S. 1608 were called average.

Now under way, in cooperation with the Bureau of Plant Industry, is a study of potato quality in relation to the different fertilizer ratios used. Specific-gravity determinations, starch, sugar, and total-solids determinations as well as cooking tests were made on 36 potato samples to determine (1) whether different sources and rates of potash influence cooking quality and (2) the effect of complete and incomplete fertilizer treatments on cooking quality. Studies so far made tend to emphasize the importance of potash. While nitrogen, phosphorus, and potassium are essential, if potash is not included in the fertilizer, the cooking quality of the tubers goes from excellent or good to only fair. This is particularly true if potash is omitted from the fertilizer for a period of years.

The preliminary work of setting up laboratory techniques for a new study of lard and rendered pork fat has been completed.

This study will be made to determine the effect of the new definitions of the United States Department of Agriculture for lard and rendered pork fat upon the cooking quality of these products available on the market. In addition, the stability of these fats is being measured by determination of the smoke point, iodine number, and free fatty acids, after various periods of storage.

Recipes using sour cream prepared from sweet cream and buttermilk were prepared at the request of the Bureau of Dairy Industry for joint publication by the two bureaus.

The effect of variety on the quality of soybean sprouts is being studied. Five of seven varieties tested—Peking, Yelredo, Georgian, Ootootan, Clemson—sprouted well, the “rag doll” method often used by seedmen being used. A low percentage of sprouts was obtained with Manchu and Illini varieties, and souring occurred too readily.

Recipes using surplus products have been prepared for distribution by the Surplus Marketing Administration to families on small incomes. To date these recipe leaflets cover eggs, dried fruits, and green vegetables, and more are in preparation.

TEXTILES AND CLOTHING

Continued war abroad and acceleration of the defense program at home are responsible for many changes in the textile and clothing field. Diminishing supplies of wool for civilian use, cotton still in surplus, and the ban on raw-silk imports, attended by expanded rayon production, mean that the homemaker will be changing her buying habits and learning new uses for the fabrics available. Furthermore, as women's occupations change, new, more suitable work clothing is a necessity. The program in textiles and clothing has been planned to meet these fast-changing conditions.

COTTON HOSE

When the ban on raw-silk imports brought an emergency situation in women's hosiery, the Bureau had ready for immediate release to manufacturers, 150 designs and specifications suited to 89 percent of their machines formerly knitting silk. This research had been begun at the request of Congress in 1939 as a means of utilizing surplus cotton and developing better looking, better fitting, better wearing hose. Consequently, this research has covered not only the designing of full-fashioned hose for women from fine-count yarns spun from long-staple American-grown cotton, but also includes laboratory tests on elasticity, and rub at heel, toe, and other points receiving greatest wear. The effect of variations in gauge, courses per inch, yarn number and twist, and construction of the welt is also considered from the point of serviceability and consumer acceptance. Wear tests on human feet have also been conducted by standardized procedure.

Two reports of such research issued during the year deal with the physical properties of the hose knit from commercial cotton yarns, and with water-repellent finishes. In the latter connection it was found that hose treated with the new compound, octadecyoxymethyl pyridinium chloride, are more water repellent and have more elasticity.

To expedite this cotton-hosiery research, a standard power knitting machine has been installed as part of the Bureau's textile equipment

at the Beltsville Research Center. At present it is being used to compile "A dictionary of hosiery designs." Instead of making up complete stockings, sample swatches are knitted. These, together with the design sketch and a description of the construction of each fabric, are made available to hosiery manufacturers. Already some 25 or 30 swatches are on file with the Cotton Textile Institute, the Mercerizers Association of America, and the National Association of Hosiery Manufacturers, and as new designs are knitted they are immediately made available to these interested trade groups. Samples from these swatches are also used to make up loan exhibits available to schools, extension groups, and organizations interested in cotton hosiery.

WORK CLOTHES FOR WOMEN

The development of suitable work garments for women now occupies a prominent place in the clothing studies. As men are called to service or find industrial employment, women are taking their place in the fields and doing more of the general farm chores. Then, too, increasing numbers of women are engaged in defense industries.

The clothing ordinarily worn by women doing housework is unsuited to these new activities on many counts—durability, protection, comfort, efficiency, and in some cases, safety. In lieu of proper clothing, women are wearing men's overalls and coveralls. These do not fit women's figures, nor are they comfortable or convenient. Women can perform their new work with greater safety and less discomfort, fatigue, and wasted energy if they have work clothes designed especially for their needs.

With these needs in mind, and with a study of the actual experience of women in various types of work as a background, the Bureau has developed 15 work outfits. These can be made economically and modified easily to suit special requirements of the individual and the difference in climate and working conditions. Commercial pattern companies and garment manufacturers are seeking these designs as fast as they are released, and some are already in commercial production.

At the request of the National Youth Administration the clothing specialists also directed the development of two uniforms for the use of NYA girls engaged in industry. These suits were designed to be made in NYA sewing rooms; thus they serve as part of an educational project and at the same time provide clothing especially designed for industrial work.

MAKING AND BUYING CLOTHING AND HOUSEHOLD FURNISHINGS

Home sewing plays an important part in stretching the clothing and home-furnishing budget. Although some furnishings such as sheets, pillowcases, and towels cost practically the same whether bought ready-made or made at home, some furnishings can be made at home with considerable savings. For example, slip covers, which are almost luxury items when custom-made, come well within the average household textile budget when they are home tailored. Made from good durable, colorfast, preshrunk materials, they go a long way toward prolonging the usefulness of a worn chair or improving

the appearance of a room. Accordingly a new publication was prepared on slip covers, dealing with every step from the selection of moderate-priced, serviceable fabrics, to the making of a pattern to fit a particular piece of furniture, to the finishing of the final seam. Since most slip covers are made of cotton, this also points the way to increased use of cotton in the household.

Tying in also with the program for wider consumer use of our surplus cotton, fabrics in the new weaves, textures, and finishes were made into different types of garments to illustrate styling and construction techniques best suited to these new materials. During the year 123 such loan exhibits were sent out on request to rural groups. Extension workers and teachers report that these samples of what can be done with cotton, so simply and yet so expertly made by home methods, are also raising standards of clothing construction for 4-H Club girls and women in the adult groups.

A complete guide to making a coat is another aid prepared to help the home sewer eager to use the money available on good-quality material and contribute her own labor in careful workmanship. The "coat schools" held by the Extension Service in several States have demonstrated the economy of home tailoring of coats in contrast to buying a poor-quality ready-made article. Lack of clear directions for the standard tailoring techniques has been a handicap to many, however. Now such a bulletin is in press, fully illustrated with pictures of every step of coat making from laying the paper pattern on the cloth to finishing the hem of the completed garment. Even suggestions on remodeling fur for the collar are included. To give even further visual aid on this subject, a series of pictorial charts have been prepared for loan to interested groups. Coming at a time when garment factories are crowded with defense orders, this information may serve an even wider group of home sewers than was originally anticipated.

On the selection side, a buying guide on boys' suits has been issued as a further contribution to the series that now covers women's dresses and slips, coats, hosiery, men's and boys' cotton shirts, and sheets, bath towels, and blankets. With the upward spiral of retail prices and the tendency toward downward spiral of quality to maintain established price lines, consumers are eagerly seeking such buying guides to assist them in obtaining maximum value for whatever amount of money they have to spend.

CONSERVATION OF FABRICS

Studies are in progress on the growth and effect of various micro-organisms which cause deterioration of cotton and wool. Damage to cotton and wool by micro-organisms causes serious loss to the consumer, farmer, and manufacturer alike. Moreover, in line with the defense program, information leading to the preservation of textile materials is highly essential. In one project sea-island cotton fiber and yarn were inoculated with *Chaetomium globosum*. The amount of oxygen consumed and catalase produced during growth of the micro-organism were measured. This involved the development of a new technique for investigating the oxygen consumption of micro-organisms growing on cotton. The Warburg apparatus origi-

nally devised for studying the respiration of tumor growths was adapted for this purpose.

It was found that the amount of oxygen consumed by *Chaetomium* growing on the fiber was significantly greater than that absorbed by the fungus growing on the yarn. These results sustained the findings of a preliminary study in which organisms growing on Acala cotton fiber consumed a significantly greater amount of oxygen than those growing on unbleached cotton fabric. The removal of noncellulosic material from the fiber during the various stages of yarn manufacture probably accounts for the difference in oxygen utilization, since these substances may act as nutrients for the organism. The amount of the enzyme, catalase, formed during the growth of *Chaetomium* may be considered a measure of the growth of the fungus. The production of a much greater amount of catalase by *Chaetomium* on the fiber than on the yarn confirms the results for oxygen consumption. These findings indicate that raw cotton will deteriorate more rapidly in a moist atmosphere than will yarn or fabric. Therefore, greater care is necessary in storing cotton fiber than in storing products manufactured from cotton unless these products contain sizing or finishing materials which may act as nutrients to micro-organisms.

Work on the prevention of mildew growth on cotton fabrics used around the home and on the farm has continued. Various chemical treatments were investigated further to obtain more conclusive data on their mildew-preventive power. As in earlier experiments the effectiveness of these treatments was evaluated in terms of change in breaking strength of the treated fabrics after inoculation and incubation with the test organism, *Chaetomium globosum*. Of the many treatments tried, only one or two had a deteriorating action upon the cloth; a few seemed to strengthen it.

Of the eight new treatments tested, six were developed in the Bureau laboratories. All six have excellent mildew-preventive properties when applied to cotton. They include immersion of the fabric in cadmium chloride or copper sulfate, followed by immersion in morpholine; treatment in chlorothymol or 2-chloro-o-phenylphenol, followed by morpholine; and in aluminum acetate or magnesium chloride, followed by 8-hydroxy quinoline.

A public-service patent has been allowed for the treatments employing cadmium or copper salts with morpholine. This process has several advantages over other treatments. Besides being very effective as a protection against mildew and rotting, it is comparatively inexpensive, is nontoxic, and has a value for home as well as commercial use. This treatment can be used for awnings, sails, tents, shower curtains, and covers for porch furniture. It was found that the treatment is effective even after five washings and after 6 months of storage. The compound has no deteriorating effect on the fabric during storage. On weathering, the cadmium chloride-morpholine application holds up better than any of the other treatments so far tested.

In order to determine the suitability of these mildew-resistant treatments for fabrics under various conditions of use, the mildew resistance of treated fabrics after repeated laundering, exposure to weathering, and storage is being determined.

During the past year an investigation was made of *Trichophyton interdigitale*, one of the micro-organisms responsible for the ringworm infection, "athlete's foot." Four different media were used, namely Sabouraud's agar, peptone agar, mineral salts agar, and water agar. It was found that the Sabouraud's and peptone agars furnished sufficient nutrient for the growth of *T. interdigitale* but no growth occurred on the others. However, growth was obtained on squares of wool cloth placed on each of the four media. *T. interdigitale* was therefore able to utilize wool fabric in the absence of added dextrose or peptone. The growth of this fungus on wool was stimulated by the addition of mineral salts. These results are of practical value because wool hose are often worn by persons troubled with athlete's foot. Since wool fabrics cannot be laundered at sufficiently high temperatures to kill micro-organisms, infected hose may be a constant source of infection. Also this fungus causes deterioration of the fabric since it uses wool as a source of nutrient. It is possible that the mineral salts contained in perspiration and absorbed by the wool hose aid in the growth of *T. interdigitale*.

Investigations of existing methods and new procedures for sterilizing fabrics have paralleled studies on the destructive action of micro-organisms. During the past year another public-service patent was granted. This patent, "Process for protecting protein fibrous materials," involves sterilizing protein fibers in the dry cleaning solvent, tetrachlorethylene.

The so-called antiseptic properties of chemically treated fabrics have also been under study. Since this is a relatively new phase of biochemical research a comparison of methods was made at the same time the bactericidal properties of the fabrics were being tested. The broth test recently developed in the Bureau laboratories possesses certain advantages over the agar-plate method. It tests the antibacterial effect of an impregnated fabric upon a given organism in contact with the cloth and determines the bactericidal as well as the bacteriostatic properties. Also the broth procedure may be adapted to test variable factors which might be encountered under practical conditions. Obviously this work has practical significance since impregnated fabrics can aid in the control of disease. The treatments also assist in the preservation of textile fabrics.

OTHER STUDIES OF FIBERS AND FABRICS

The relative merits of different fibers are being studied in terms of their usefulness in finished materials in order to determine the fibers and fabrics most desirable for specific purposes. In one such study when the relative durability of percale, fine-count, and medium and heavyweight sheeting were compared it was found that the heavyweight sheeting constituted the best buy. This sheeting wore longer than any of the others, was intermediate in price, and in general was heavier, stronger, and less chemically deteriorated than the other classes both when new and during service. Though more expensive, the percale and fine-count sheets did not last so long as the heavyweight muslin. They were, however, more pleasing in texture and appearance. The mediumweight muslin sheeting was lowest in price and gave the poorest service.

A cooperative study with the Bureau of Agricultural Economics in which cotton and rayon yarns were knitted into underwear fabrics of comparable construction and then manufactured into vests and union suits showed that cotton is more durable than rayon for both types of garments. However, rayon wore better in vests than in union suits. The cotton union suits wore almost twice as long as the rayon but only approximately one-third longer than the rayon vests of comparable construction.

In a study now under way various percentages of reprocessed wool and spun viscose rayon have been mixed with new wool for suiting. Information obtained in this study will show the effect that replacement fibers may have upon the serviceability of a fabric. This and similar studies will point the way toward better utilization of wool for civilian purposes.

The recent legislation making it mandatory to label wool products has increased interest in methods for determining the amount of wool in mixed fabrics. Under the joint auspices of the American Society for Testing Materials and the American Association of Textile Chemists and Colorists the Bureau has again taken the leadership in a second cooperative study to compare two well-known methods, namely the aluminum chloride and sulfuric acid methods. The fabrics used in this work had been made for experimental purposes and contained known amounts of wool. Results of the tests indicate that both methods are sufficiently accurate and precise to be useful; however, the sulfuric acid method is preferable because it is more convenient, less time-consuming, and the calculations showed that for routine testing a smaller number of samples would probably be sufficient.

Through the study of the physical properties and performance of various household and clothing fabrics in use, it is possible to develop minimum specifications. During the past year such specifications have been developed for three grades of all-cotton upholstery tapestries, two types of outing flannel, and cotton covert and chambray used in men's work shirts. Those on upholstery tapestries and corduroy suitable for boys' wear are under consideration by Subcommittee A-6 of the American Society for Testing Materials as tentative specifications.

HOUSEHOLD EQUIPMENT AND HOUSING

The tremendous drive of the Nation's defense effort is making new demands each day for effective utilization of all our resources. Consumers are requested, again and again, to buy wisely and to conserve as much as possible their household equipment and furnishings. The Housing and Household Equipment Division has been, for many years, carrying on a research program geared to this very idea—wise buying, efficient use, and conservation of all household equipment. In addition, housing studies are directed toward efficient space planning and the establishment of desirable minimum requirements for working space and storage areas.

HOUSEHOLD EQUIPMENT

Information obtained from equipment studies assists consumers in the selection of equipment to meet their individual needs, to use it efficiently, and to care for it properly. The studies also provide the basic information necessary for the establishment of national standards and the development of informative labels. During the past year electric hand irons, refrigerators, and roasters, gas and electric ranges, and cooking utensils have been tested in the course of the regular research program, and several special, or emergency, assignments have been completed.

Electric hand irons have been tested for their ability to provide proper ironing temperatures for different types of fabrics; accuracy of the thermostat settings marked for different fabrics; the consumption of electrical energy for a given amount of work; the time necessary to accomplish this amount of work; and the ease of handling each iron. Results from tests to date show that both low-wattage (550-800) and high-wattage (800-1,000) irons give satisfactory results on lightweight fabrics. Irons using the lower wattages, however, do not maintain an adequate temperature for good results with heavier fabrics. Tests indicate that there is not a great difference in time or energy consumption between lightweight, high-wattage, thermostatically controlled irons and heavyweight, low-wattage, non-thermostatically controlled irons. The average energy consumption for all irons tested was 0.554 kilowatt-hours per hour.

Specifications for electric hand irons were prepared for group purchase in the Farm Security Administration, and the Rural Electrification Administration was assisted in preparing specifications for electric washing machines.

Comparison of test results on 1941 models of electric refrigerators and the results of similar tests on 1940 models indicates a slight decrease in energy consumption. The greatest increase in efficiency was found in makes that rated the lowest in previous tests.

Tests on 1941 models of ranges showed that standard burners on gas ranges will bring 1 quart of water to the boiling point in approximately 7 minutes and 30 seconds and that they have an average efficiency of 34 percent. Six-inch electric surface units will bring 1 quart of water to the boiling point in approximately 7 minutes and 48 seconds; they have an average efficiency of 64 percent. Ring-type units are slightly less efficient than the tubular type.

With the development of national standards for the construction of household equipment there immediately arises a necessity for simple standard test methods to determine whether the equipment meets these standards. In cooperation with the National Household Equipment Research Committee the Bureau has developed standard tests for ranges and electric roasters and is working on tests for hand irons.

Tests on speed of heating and efficiency of materials used in double boilers showed stainless steel, copper-clad stainless steel, and enamel to require slightly less time and fuel than aluminum; glass required approximately 50 percent more time and fuel.

A classified list of all types of household equipment in which aluminum is used was prepared for the Defense Commission, and

possible substitutions were recommended. A list of utensils that should be given preference in the use of aluminum was also prepared.

Assistance was also given to the American Red Cross in its purchase of cooking and serving equipment for 30,000 refugees in southern France, and specifications were drawn up for a standard unit of cooking and serving equipment to be used in future purchases.

A 2-week short course in rural electrification was conducted for home demonstration agents in West Virginia. With an intensified rural electrification program, an urgent need has arisen for guidance of farm families in the effective, profitable, and economical use of electricity on the farm and in the home. At the present time many extension service workers have had no opportunity for special training or experience in the field of rural electrification, and there are few trained leaders. Educational work in this field is needed badly.

At the request of the National Household Equipment Research Committee a bibliography of both technical and popular references has been prepared for use by research workers, teachers, and extension workers. In cooperation with the Extension Service a list of popular references on household equipment and kitchen improvement has been issued.

HOUSING

The Bureau's housing studies are directed toward establishing desirable minimum requirements for working space and storage areas in kitchens for families of different sizes in the middle- and low-income groups. The time and motion study reported last year has been continued. Four kitchens representing the L, broken-L, and the parallel-wall types of arrangement of equipment have been studied and meals cooked for families of four and eight. Studies to date indicate that there is little difference in the desirable minimum amounts of kitchen space requirements for low- and middle-income groups. The space required for preparing and storing food was determined by estimating the minimum utensils and working space necessary to prepare menus recommended in *Diets To Fit the Family Income* (Farmers' Bul. 1757). It was found that approximately the same quantity and variety of foods were prepared for both income groups, thus the working areas and the number of cooking utensils were similar.

The desirable amount of working space and storage area, however, for the middle-income group is higher, since families in this group usually have more cooking equipment, dishes, and linen than the minimum required.

A minimum of 36 inches to the right of the sink for food preparation and stacking of dishes and 30 inches to the left for serving and dish drying is desirable for families of four, while one of 42 inches to the right and 36 inches to the left of the sink is best for families of eight. Preliminary work showed that the U arrangement of equipment was not economical for minimum requirements of space or storage areas. For efficient utilization of the "dead corner" in a base cabinet in the U and L types of arrangement, a cabinet door 15 inches or more in width should be provided on at least one side of the corner. To do this requires that more than the minimum amount of working space be provided.

The L and broken-L types of arrangement are best for farmhouses, since they provide the most economical and convenient space arrangement for eating in the kitchen.

Floor plans and elevations of the kitchens studied have been prepared for use by the Rural Electrification Administration and the Extension Service in their kitchen-modernization and rural-housing programs.

A bibliography on housing and household equipment was prepared for the National Defense Commission. A manual on simplified household-cleaning practices has been prepared at the request of Government and private agencies carrying on maid-training projects.

The National Youth Administration was assisted in planning resident centers. An efficient arrangement of storerooms and equipment for kitchens and bake shops was planned for centers serving 200 to 500 people. The size and amount of equipment was specified for groups ranging from 10 to 500.

PUBLICATIONS AND INFORMATION SERVICES

Confronted with new problems, homemakers, economic planners, industrialists, scientists, and teachers are seeking the help of reliable, unbiased scientific facts stemming from the research of the Bureau of Home Economics. The urgent need for such information is strikingly evident in the number of publications distributed upon request this past year. The number more than doubled and reached an all-time high of 4,215,000.

Twenty-five new publications were issued during the year, and eighteen additional ones were submitted for publication. Twenty-two articles were written for journals published outside the Department of Agriculture, and 10 mimeographed reports were issued.

The results of the Bureau's research reach the public in many ways. Forty broadcasts given from Washington by members of the Bureau's staff on the National Farm and Home Hour over a coast-to-coast network brought approximately 100,000 written requests for publications. Scripts giving the homemakers facts on all phases of the Bureau's work were sent to between two and three hundred stations for broadcasting locally. The weekly Market Basket press release was used by newspapers and magazines all over the country. Spot-news releases were prepared as the occasion demanded.

On the exhibit side, assistance was given in preparing a display of educational materials for the delegates to the National Nutrition Conference in May and likewise in planning a series of nutrition exhibits for display by the Department of Agriculture at State fairs. Sixty-three cardboard exhibit panels showing publications available from the Bureau were circulated to State home economics meetings and regional conferences. Three series of poster charts, Making a Coat, Buying Boys' Suits, and Making Slip Covers, were made up for the use of Extension Service workers in their educational programs. There are 20 sets of each of the three series; they are available for loan only.

The complete list of publications issued during the fiscal year follows, together with the titles of the articles published in outside journals.

DEPARTMENT PUBLICATIONS

- Family income and expenditures, Southeast region. Part 1, family income. Urban and village series. Dorothy Brady, Day Monroe, Gertrude Schmidt Weiss, and Thelma Dreis. Misc. Pub. 375.
- Family income and expenditures, Middle Atlantic, North Central, and New England regions. Part 1, family income. Farm series. Dorothy S. Martin, Day Monroe, Dorothy S. Brady, and Elizabeth Phelps. Misc. Pub. 383.
- Family income and expenditures, five regions. Part 2, family expenditures. Urban and village series. Dorothy S. Brady, Day Monroe, Elizabeth Phelps, and Edith Dyer Rainboth. Misc. Pub. 396.
- Family housing and facilities, five regions. Urban, village, and farm. Hazel Kyrk, Day Monroe, Maryland Y. Pennell, and Edith Dyer Rainboth. Misc. Pub. 399.
- Family expenditures for medical care, five regions. Urban, village, and farm. Helen Hollingsworth, Day Monroe, Margaret C. Klem, and Karl L. Benson. Misc. Pub. 402.
- Family food consumption and dietary levels, five regions. Farm series. Hazel K. Stiebeling. Day Monroe, Callie M. Coons, Esther F. Phipard, and Faith Clark. Misc. Pub. 405.
- Family expenditures for automobile and other transportation, five regions. Urban, village, and farm. Day Monroe, Dorothy S. Brady, June F. Constantine, and Karl L. Benson. Misc. Pub. 415.
- Family expenditures for clothing, five regions. Urban and village series. Maryland Y. Pennell, Day Monroe, Kathryn Cronister, Geraldine S. DePuy, and Marjorie W. Ellsworth. Misc. Pub. 422. (In press.)
- Family expenditures for clothing, five regions. Farm series. Day Monroe, Maryland Y. Pennell, Elizabeth Phelps, June Constantine Hopper, and Helen Hollingsworth. Misc. Pub. 428.
- Family expenditures for housing and household operation, five regions. Urban and village series. Hazel Kyrk, Day Monroe, Kathryn Cronister, and Margaret Perry. Misc. Pub. 432.
- Family expenditures for furnishings and equipment, five regions. Urban, village, and farm. Day Monroe, Helen Hollingsworth, Margaret Perry, and Maryland Y. Pennell. Misc. Pub. 436.
- Family food consumption and dietary levels, five regions. Urban and village series. Hazel K. Stiebeling, Day Monroe, Esther F. Phipard, Sadye F. Adelson, and Faith Clark. Misc. Pub. 452. (In press.)
- Family expenditures for personal care, gifts, selected taxes, and miscellaneous items, five regions. Urban, village, and farm. Day Monroe, Dorothy S. Brady, Edith Dyer Rainboth, and Ellen D. Riley. Misc. Pub. 455. (In press.)
- Family expenditures for education, reading, recreation, and tobacco, five regions. Urban, village, and farm. Day Monroe, Dorothy S. Brady, Maryland Y. Pennell, and Miriam H. Coffin. Misc. Pub. 456. (In press.)
- Family expenditures for housing and household operation, five regions. Farm series. Hazel Kyrk, Day Monroe, Dorothy S. Brady, Colette Rosentstiel, and Edith Dyer Rainboth. Misc. Pub. 457. (In press.)
- Family income and expenditures, Southeast region. Part 1, family income. Farm series. Dorothy S. Brady, Day Monroe, Margaret Perry, and Mary Ruth Pratt. Misc. Pub. 462. (In press.)
- Changes in assets and liabilities of families, five regions. Urban, village, and farm. Dorothy S. Brady, Day Monroe, Janet Murray, Yetta A. Carmel, and Majorie W. Ellsworth. Misc. Pub. 464. (In press.)
- Family income and expenditures, five regions. Part 2, family expenditures. Farm series. Day Monroe, Dorothy S. Brady, Margaret Perry, Kathryn Cronister, and Edith Dyer Rainboth. Misc. Pub. 465. (In press.)
- Adjusting farm family living to the impact of war abroad and home defense. Misc. Pub. 419. (In cooperation with Bureau of Agricultural Economics.)
- Are we well fed? A report on the diets of families in the United States. Hazel K. Stiebeling. Misc. Pub. 430.
- Eat the right food to help keep you fit. Unnumbered pub. (In cooperation with Children's Bureau, U. S. Department of Labor, and Office of Education and Public Health Service, Federal Security Agency.)
- Effect of food stamp plan upon diets of low-income families, Dayton, Ohio, 1939. Hazel K. Stiebeling and Sadye Adelson. In U. S. Dept. Agr. Unnumbered Pub., Economic Analysis of the Food Stamp Plan, pp. 66-79.

DEPARTMENT PUBLICATIONS—Continued

- Quality of frozen poultry as affected by storage and other conditions. Harold M. Harshaw, Walter S. Hale, T. L. Swenson, Lucy M. Alexander, and R. R. Slocum. Tech. Bul. 768. (In cooperation with Bureaus of Animal Industry and Agricultural Chemistry and Engineering, and Agricultural Marketing Service.)
- School lunches using farm surpluses. Rowena Schmidt Carpenter and Fanny Walker Yeatman. Misc. Pub. 408. (In cooperation with Surplus Marketing Administration.)
- Home canning of fruits, vegetables, and meats. Louise Stanley, Mabel Stienbarger, and Dorothy Shank. Farmers' Bul. 1762, revised.
- Egg dishes at low cost. Unnumbered Pub. (In cooperation with Surplus Marketing Administration.)
- Fats and oils for cooking and table use. Elizabeth Fuller Whiteman and Florance B. King. Leaflet 204.
- A compilation of the vitamin values of foods in relation to processing and other variants. Lela E. Booher, Eva R. Hartzler, and Elizabeth M. Hewston. Cir. 638. (In press.)
- The vitamin A values of foods as determined by the rat-growth method. Lela E. Booher and Rosemary Loughlin Marsh. Tech. Bul. 802. (In press.)
- Community food preservation centers. Misc. Pub. 472.
- Poultry cooking. Lucy M. Alexander. Farmers' Bul. 1888. (In press.)
- Sour cream: How to prepare and use it at home. Leaflet 213. (In cooperation with Bureau of Dairy Industry.)
- Dried fruits in low-cost meals. Unnumbered Pub.
- Body measurements of children for garment and pattern construction. Ruth O'Brien, Meyer A. Girshick, and Eleanor P. Hunt. Misc. Pub. 366.
- Women's dresses and slips: A buying guide. Clarice Louisba Scott. Farmers' Bul. 1851.
- Slip covers for furniture. Bess Viemont Morrison. Farmers' Bul. 1873.
- Buying boys' suits. Clarice L. Scott. Farmers' Bul. 1877.
- Serviceability of selected types of cotton and rayon knit underwear. Ruth E. Rogers, Margaret B. Hays, and John J. Brown. Tech. Bul. 803. (In cooperation with Bureau of Agricultural Economics.) (In press.)
- Women's measurements for garment and pattern construction. Ruth O'Brien and William C. Shelton. Misc. Pub. 454. (In press.)
- Shoe sizing and fitting. An analysis of practices and trends. Carol Willis Moffett. Misc. Pub. 469.
- Coat making at home. Margaret Smith. Farmers' Bul. 1894. (In press.)
- Closets and storage spaces. Maud Wilson, J. Robert Dodge, and Elma Edwards. Farmers' Bul. 1865. (In cooperation with Bureau of Agricultural Chemistry and Engineering.)
- Electric light for the farmstead. Farmers' Bul. 1838. (In cooperation with Bureau of Agricultural Chemistry and Engineering.)

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- Agricultural surpluses and nutritional deficits. J. P. Cavin, Hazel K. Stiebeling, and Marius Farioletti. U. S. Dept. Agr. Yearbook 1940: 329-341, illus. (In cooperation with Bureau of Agricultural Economics and Agricultural Adjustment Administration.)
- Nutrition. Hazel K. Stiebeling and Ruth M. Leverton. Ann. Rev. Biochem. 10: 423-448. 1941.
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- Lisle hose for nurses. Emma C. Petersen. Mod. Hosp. 55 (4): 88, illus. Oct. 1940.
- Mildew-resistant treatments on fabrics. Margaret S. Furry, Helen M. Robinson, and Harry Humfeld. Indus. and Engin. Chem. 33: 538-545, illus. Apr. 1941. (In cooperation with the Bureau of Plant Industry.)
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- Physical properties of cotton corduroy for boys' clothing. Gladys White. Amer. Dyestuff Rptr. 30: 295-298, 315-316. 1941.
- Physical analysis of 31 qualities of outing flannel. Margaret B. Hays and Gypsy B. Frankenberg. Jour. Home Econ. 33: 404-408. June 1941.
- Comparison of growth of *Trichophyton interdigitale* on wool fabric with and without additional nutritive media. Ruth Elmquist Rogers, Doris J. Hirschmann, and Harry Humfeld. Soc. Expt. Biol. and Med. Proc. 45: 729-733. 1940. (In cooperation with the Bureau of Plant Industry.)
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